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ABSTRACT

Reports of methods by which selected high schools have integrated energy education into classrooms are presented. The 12 case studies report what resources the schools have employed and how they have utilized these resources. Also included is information concerning other curriculum materials the teacher may find useful. A number of sources of such material are reported in a bibliography with brief annotations. (Author/RE)

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ENERGY EDUCATION PROGRAMS

HIGH SCHOOL PROGRAMS AND RESOURCES

Compiled by

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PREFACE

This bulletin contains examples of energy education occurring in selected high school classrooms and/or schools and resources to use to provide energy education.

The American tradition of state and local control of education results in a tremendous range and variety of curriculum developments concerned with energy. Some state departments of education have provided good teaching materials and good in-service education; most have provided little. Some city school systems and school building principals have been quite successful in incorporating substantial amounts of energy education into their schools and classrooms. But the prime determinants of whether energy education is included in a teacher's program are the knowledge, commitment, enthusiasm, and skill of the individual teacher.

The teachers who have submitted the reports that follow are doing in the judgment of their principals, supervisors, state department consultants, or others, a good job with energy education in their classrooms. Neither the teachers nor the compilers of this bulletin are presumptuous enough to suggest that the examples which follow are the "best" or the only ones which might be found. But the ERIC Clearinghouse for Science, Mathematics, and Environmental Education believes that the examples can be useful to persons who are searching for school systems, schools, principals, and especially classroom teachers who are willing to share their ideas about energy education.

The ERIC system receives many documents related to energy education. The resources listed are among those announced in Resources in Education and available through the ERIC Document Reproduction Service. An ERIC search or one of the bibliographies listed will provide additional teaching resources.

INTRODUCTION

Changing priorities are a fact of life for America's schools. It seems that every time the teacher looks beyond the confines of the immediate classroom, he or she is confronted with some different topic, some new "must teach" area, some additional objective for which he/she should facilitate learning—for the good of the school, of the student, of our society. At some times, these priorities are readily acceptable to school, student, society, and teacher; at other times, differences of opinion exist as to what in fact are appropriate priorities. In terms of content areas alone, the past 30 years have seen shifting priorities directed at science/aerospace education, environmental/ecological/conservation education, "back to the basics"—and most recently, energy education. It is understandable that the teacher may take the skeptic's view of such shifts in emphases. Teachers are still teachers, classrooms are still classrooms, kids are still kids. Likewise, society is still society—but it changes, in terms of priorities, problems and perceptions much more rapidly than do teachers, schools, and children.

Since 1973, our societal view of energy has taken a series of abrupt shifts. It is not now, nor has it been, a matter of debate that ours is, and has been, an increasingly energy-dependent society. The shifts have been in terms of our perceptions of available supplies, most appropriate types and sources, fossil and non-fossil, alternative and appropriate technologies, and need for and procedures of conservation. The physical scientist is tempted to say "I told you so" with respect to society's recent recognition of diminishing supplies; the conservationist may tell us that his traditional view is newly legitimized; the economist tends to talk in terms of supply and demand and cost curves; the political scientist deals in the "art of the Possible;" the environmentalist warns us of conflict between environmental values and energy alternatives.

The teacher is then confronted with the task of integrating a massive array of information—fact, opinion, perspective, priority—into some semblance of a teachable, and learnable package, whether it be a lesson, a unit, or a comprehensive program. It might be relatively easy, if there were agreement on what should be taught, what goals and objectives are desired, what society's long-term needs are, and what students really need to know about energy to function effectively as members of society now and in the future. The one conclusion about which there is consensus is that they need to know more, and it is in large part the responsibility of the schools to "teach it."

But there is no shortage of information. Much has been, and continues to be, written about energy, in terms of background information, and within the frameworks of program, curriculum, and lesson materials. Such information is available to the teacher who looks for it. The teacher's problem is really in terms of seeking, selecting, adapting, and packaging, keeping in mind the realities of his/her local situation—community, school, classroom, and children.

Few teachers will be in situations such that they will teach courses entitled "Energy"; few will be faced with the necessity, or the opportunity of developing an extended curriculum in this area. Most find themselves in situations where they must, or should, incorporate energy education into their ongoing programs—as a part of science, or of social studies, or of some other existing curriculum area, or as a short-term special study in a less structured school environment.

This bulletin presents examples of how some teachers, and schools, have incorporated energy education into ongoing programs. They are not presented as ideal models, either in the sense that all of the fruitful possibilities are advanced or in the sense that they will be appropriate in every classroom. But they do share two common denominators: they are all "real" and they all "work" in the situations in which they exist. It is likely that at least some of them will be adaptable to other classrooms in other locations.

Also in this bulletin is information concerning other curriculum program materials which the teacher may find useful. A number of sources of such materials is reported in the Bibliography section with brief annotations which are intended to provide enough information for the teacher to decide whether or not they will be useful in given situations. The teacher's task, then, becomes one of selection from a wealth of resources—and translating those raw materials into products appropriate to his/her learners.

EXAMPLES OF HOW HIGH SCHOOL TEACHERS ARE INCLUDING ENERGY EDUCATION IN THEIR PROGRAM

General William Mitchell High School
1205 Potter Drive
Colorado Springs CO 80909

Submitted by David C. Ulmer, Jr., Science Instructor

In addition to participating in writing and/or evaluating energy education materials from well known efforts such as The National Science Teacher Association Project for an Energy Enriched Curriculum and Energy and Man's Environment, Mr. Ulmer reports that he has used in his classroom activities such as the following which are summarized from more detailed lesson plans:

1. CITY BUS SERVICE—An activity designed to expose students to route maps, bus schedules, and service available between their neighborhood and points of interest to them. A high point of this activity is actually riding the bus, making a transfer enroute and recording the pluses and minuses of this mode of public transit.

2. A QUEUE PROBLEM...DEPARTURES FROM A LARGE METROPOLITAN AIRPORT—Queues...waiting lines...are a product of technology and population. This activity provides some insight into the queues that develop at a large airport as many customers (departing aircraft) attempt to use the same services in a limited time period.

3. THE MATHEMATICS OF MOTION...TRACKS ARE BACK—An activity designed to expose students to the national rail passenger network operated by Amtrak. Ideas like passenger miles/gallon of fuel consumed may be developed in this activity.

4. CUTTING AND PLUCKING THE RUG—A model of the world's remaining oil reserves using a piece of shag rug to represent the oil reserves. Graphs representing a linear and an exponential consumption rate are developed from data collected in the activity.

5. CARTOON SCHOOLING—Editorial cartoons are used to develop points concerning energy and the environment. Students are encouraged to write short stories about current issues using editorial cartoons to illustrate their stories.

Rifle Junior High School
Box 872
Rifle CO 81650

Submitted by Mr. David D. LeMoine

Students in seventh grade social studies classes undertake a 3- to 5-week study designed to (a) identify and define the energy problem, (b) collect

data concerning the energy crisis, (c) sort, organize and order their data, and (d) from their data, reach conclusions about our energy future.

Resources used in the study include:

1. a 64-page text-workbook, Energy, by Mr. LeMoine, available for $1.14 from Sadlier-Oxford Publishing Company;

2. pamphlets obtained by student-written letters to agencies and corporations such as U.S. Department of Energy, public utilities, coal companies, major oil companies, Solar Energy Research Center;

3. field trips taken to places such as a stripmining operation, an electric generating plant, a coal mine, a natural gas distribution center, a solar home, and an oil field; and

4. interviews in which students, using questions which they have prepared, interview their parents, one fellow student, and at least one person outside their family concerning the energy problem.

The class is divided into teams and assigned an alternative energy source such as coal, oil, natural gas, wood, geothermal, uranium, and others. Using the Energy text, the pamphlets ordered, the field trips, and the interviews, teams collect data concerning their assigned energy source. Teams are instructed to identify the positive as well as negative aspects of their energy alternative.

Once the teams have had sufficient time to learn about their assigned energy source, they all participate in an energy simulation. One of the team members is assigned to act as the head of the Department of Energy. The other team members must prepare a case to be presented to the D.O.E. head. They must try to convince him that "their" energy source should be adopted nationwide. The posing D.O.E. head must be prepared with facts to dispute the team's case. Classroom members not involved in the simulation on that day are asked to take notes on the pro and con of each energy source and to contribute during a question-and-answer period at the end of the activity. The debates which result from this simulation make for interesting head-on collisions.

Once the research and simulation are over, it is time for students to design the energy future. They pretend that the year is 2050. Pupils write a report on what the energy world will be like in this futuristic setting. They describe land, sea, and air transportation. They design futuristic energy efficient homes. They are encouraged to be creative. Students accompany their reports with drawings of their original ideas.

Note to ERIC from Mr. LeMoine:

The two-page restriction has made it difficult to describe all the "neat" things which went on in the classroom. We challenged another school to an energy saving contest and spent the savings on school supplies and a student party. Students made an energy conservation slide show, etc., etc. I will be happy to tell you more.

Boca Raton Community High School
1501 N.W. 15th Court
Boca Raton FL 33432

Submitted by Martin Guttman, Directing Teacher of Energy Project

Ninety science students were involved in a 1977-78 school year special energy education project "Future Sources of Energy" funded by a mini-grant from the Florida Department of Education, Office of Environmental Education. The results of student work groups are summarized in a 113-page report in which Mr. Guttman offers the following general assessment:

> Throughout the year, the students worked together in groups supervising each other. They worked with professionals, they researched material in the library, they applied physical laws, they experimented with their projects and documented their work. Without any question, these projects could not have been possible without mini-grant support. Some students were able to exhibit their work during the May 3rd Sun Day celebration at the Boca Raton Mall. This way the community had a chance to see what materials are being taught at the school. It seemed that the citizens enjoyed our projects and showed a great interest in the energy crisis.
>
> During the year we received the help of many professionals from the local community such as the solar industry, Florida Atlantic University and other organizations.

Student groups worked on the following projects:

- Bike generator
- Energy cycle
- Fresnel lenses
- Home energy conservation
- Lighting efficiency
- Methane gas
- Solar cooker
- Solar dehydrator
- Solar reflecting films
- Solar still
- Solar water heating
- Water (current) generator
- Water wheel
- Wind generator
- Solar cells

The previous year the Science Club at Boca Raton High School, at the suggestion of the principal, undertook the task of planning for and overseeing energy conservation efforts in the school. Savings amounted to about $9,000 in 1976-77 and about $24,000 the following year.

Pocatello High School
School District #25
3115 Pole Line Road-P.O. Box 1390
Pocatello ID 83201

Submitted by Annabelle Lerch

Energy concerns are emphasized at Pocatello High School in two courses: chemistry and advanced biology. In chemistry, the effects of nuclear energy as an alternative source are considered. A tour of nearby Idaho Nuclear Engineering Laboratories is included, as well as a presentation of the environmental problems of nuclear energy by the Idaho Conservation League. Discussions on solar energy and geothermal energy are also conducted.

In advanced biology, approximately six weeks are spent studying energy and the environment. Units from the Interdisciplinary Approaches to Chemistry module, The Delicate Balance, are used as the basis of this study. Individual students research an energy-related topic of their choosing and report to the class on their findings. Appropriate films such as "The Energy Crisis" are shown and also used as the basis of discussion.

The advanced biology class involved the high school student body and the community in the celebration of Sun Day. Those walking or riding bikes to school were eligible for prizes donated by local merchants. Films stressing present and future energy problems and conservation were shown to many classes. The energy simulator was also demonstrated throughout the day to interested groups of students.

Mariemont High School
3812 Pocahontas Avenue
Cincinnati OH 45227

Submitted by Richard Bartlow, Science Department Chairman

Mr. Bartlow reports that the most successful energy-related unit used in the high school has been developed and used by Duane Correll in a life science class. The sophomore students, who are generally slow readers, have responded positively to the unit and seem to enjoy the various activities.

The focus of the unit is directed toward an understanding of population-food-energy relationships. Materials are heavily drawn from the 1976 NSTA booklet, Agriculture, Energy and Society.

Some aspects of the unit involve:

Performance objectives on energy

Population growth
- birth rates
- death rates
- cause of death
- developed nations vs. "third world"

Inventory sheet with a scale for agree-disagree, samples follow:
- #4 The United States should encourage people in developing nations to use farming and food processing methods like us.
- #9 Processing food uses more energy than growing food.

Hidden word search, a vocabulary builder

NSTA exercises (examples)
- Diminished Returns on the Farm
- Crop Drying
- Energy Efficiency in Corn Production

Lab exercises from Patterns and Process

Film and Worksheet
- Energy and Life
- Food or Famine

Multiple Choice Test

The science department at Mariemont High School is planning another energy unit to be used in an interdisciplinary chemistry-physics course later in the 1978-79 school year.

Walnut Springs Junior High School
888 East Walnut Street
Westerville OH 43081

Submitted by Charles Fulton

In the Westerville School System, a unit on energy is part of the junior high school science curriculum. This unit covered the subject in a superficial manner and the students saw little personal significance in it. As the energy problem became more apparent with the OPEC embargo and school closings due to the lack of energy, I decided to change the unit. To help gather information for the unit, I attended the energy workshops sponsored by The Ohio State University in the summers of 1977 and 1978.

As a result of the workshop, I planned a totally new unit. My unit includes lectures, activities and audio-visual materials. I begin with an overview of energy production and use in the past, present and future.

I then focus on Ohio's particular energy problems. The major source of energy in Ohio is coal, but the coal has a very high sulfur content. The students study the problem of stripmining and its consequences and the burning of Ohio coal with its increased pollution. The alternatives of importing western coal or installing anti-pollution devices to our generating plants, both with greatly increased costs, are studied. Alternatives to coal itself such as nuclear energy and solar power are considered.

The students begin to view the energy problem as a personal one. They trace the energy they use back to its point of generation. Students compile a survey of their personal energy use, family patterns of use and energy use by certain community businesses. The students become excited about these activities and show real pride in their successful attempts at energy conservation. As a teacher I have been excited because once the unit is set in motion, and students themselves take over and carry it even further than I anticipated.

Other teachers in my building have become involved. First they were simply being interviewed about their uses of energy. Eventually, however, areas such as social studies and mathematics have begun to present concepts using energy as the focus. My principal became involved to the extent that he allowed students to do an energy survey of the building and as a result of the survey, he took steps to conserve energy at the school. Local businesses were surveyed and when shown a graph of their daily electrical usage, some took steps to conserve.

The energy unit I present to my students has changed from one which had little relevance to present-day energy problems to one in which students actively and enthusiastically study significant energy issues.

South High School
5000 Shankland Road
Willoughby OH 44094

Submitted by Joe Kemata, Biology Teacher

The council meeting is rapped to order by chairman Ron Erich. He's nervous and rightfully so. For six weeks these chambers have been the site of heated debate over the proposed construction of a nuclear power plant. The physicists, consumer advocates, and environmentalists are gone now, having left their expert opinion and advice behind with the assembly. All have been affected: Sheila Woods, the housewife who is concerned for the safety of her children; Rich Kratche, the arc welder who is worried about fossil fuel shortages and rising prices; Kirk Bole, the park ranger who believes we should be reducing our fuel usage rather than finding ways to increase it.

The council members themselves have assisted in the research necessary for them to make an intelligent decision, each of the 25 being responsible

for investigating a particular facet of the problem and for presenting it to their fellow members. Whatever choice they make will be an informed one.

The murmurs die down as chairman Erich speaks...

On four occasions in the past two years the above scene has been re-enacted, not in smoke-filled city hall chambers, but rather in tenth-grade biology classes as part of a rather dramatic class project dealing with several aspects of the energy crunch.

Their work was divided into research and presentation components, the first two or three weeks being spent on research. Initially, the students' list of questions referring to the proposal that a nuclear power plant be built in their community was written on the board and supplemented with my own questions. This afforded them a wide range of areas from which to choose and assured that certain issues I considered important would not be overlooked. The completed list has averaged from 40-60 questions, touching upon history of power plants and energy consumption, population and energy use, fossil fuel mining and burning, nuclear generating plants, environmental factors, politics and possible alternative sources of energy, to mention a few.

Each student picks one or two questions to research. They are encouraged to help each other answer questions and find information. My role during this phase was about 10 percent resource person and 90 percent harried librarian. I would lead them to the information but would not spoon-feed them the answers, although occasionally I was able to draw from my years of experience as a frustrated performer to give them hints on how to hype up their presentations.

Most of the research work was performed using a numbered classroom file, containing hundreds of titles of newspaper clippings, magazine articles, books, pamphlets, slides and transparencies. The file consists entirely of free materials obtained from workshop courses, federal agencies, consumer groups, public utilities, and personal collections. New materials are constantly being added.

Each student was given a fictitious role to play as a member of our community. They included housewives, students, factory workers, retirees, doctors, a physicist, a park ranger, a reporter, a few teachers, a truck driver, a mechanic, a dentist, a lawyer, a small businessman, and an environmentalist. The roles were picked out of a hat. Each student had to fill in details about his role, such as age, education, hobbies, income, initial feelings about nuclear energy, and then introduce himself to the rest of the class.

A panel of five was chosen at random. Their job was to present a summary of the findings at the conclusion of the presentations. The presentations themselves were delivered in a town meeting setting, during which anyone could question the presenter preferably with the emphasis on concerns related to their roles. These hearings were presided over by a chairperson chosen by the five panel members from their number.

My role, coincidentally enough, was that of an "aging biology teacher." I was not on the panel and participated as a very talkative community member. I tried to ask clarifying questions and keep a rather low profile throughout, which was excruciating for a center-stage person like myself. The chairperson was responsible for running the proceedings and taking questions and, several times, he rapped me for being out of order.

Toward the end of the presentation phase, the classes have had several personal contact opportunities. They have scheduled speakers from the public relations departments of power companies and from anti-nuclear groups as well, and also have made conference phone calls to a physicist in Columbus, Ohio and to a consumer advocate in Washington, DC. These experiences were very rewarding as the students at this point were quite confident in their nuclear background and were determined not to be snowed or patronized. They were using these experts as resources, to find out answers to questions their research failed to uncover.

Local press coverage is usually arranged on the final day when the classes, dressed in their roles, are to hear summaries and recommendations from the panel and vote on the plant installation. I have found the debate preceding the vote to be stimulating, often heated. Playing their roles to the hilt and depending on each other for clarifying facts, they experience the frustration and elation of advocacy politics.

Their final decisions, according to post-project follow-ups, seem to be based largely on the guest speakers' rapport and honesty, and the availability of pro and con resources in the literature. In the end, most understand that it is very difficult to resolve a complex issue with a simple "yes" or "no," but that even those choices are meaningless until they are explored in depth.

Ridley Senior High School
1001 Morton Avenue
Folsom PA 19033

Submitted by Dr. Herbert Pless, Project Leader

The following summary of Project DETECT (Developing Educational Talents for Energy Conservation Tactics) is taken from a detailed 42-page report submitted to the funding agency.

Project DETECT is an energy conservation program run by the gifted students in grades 10 through 12 of the Ridley School District. Funded by Project E3 (Energy, Economics and the Environment), DETECT has been actively involved in surveying the homes of interested residents of the school district to determine weatherization and insulation needs in an effort to reduce the total energy consumption in the school district.

Students make a complete heat-loss analysis of the buildings with the help of a homeowner-completed checklist and an infrared point scanning device which can accurately measure R-factors of walls and ceilings. The free service provides the homeowners with a cost breakdown of the heating requirements due to infiltration of air, floors, windows and doors, ceilings and walls, and lists the projected cost savings as a result of improvements suggested by the students.

In addition to providing these home heating surveys, the students have been working on involving the rest of the school district and the community in becoming involved in conservation. An elementary school essay contest was conducted for grades 3 through 6 and winning essays were published and their authors received energy-related prizes. Newsletters and pamphlets were also written and distributed throughout the community.

Upper Dublin Senior High School
800 Loch Alsh Avenue
Fort Washington PA 19034

Submitted by Dr. William Ritter

The school's energy education project entitled "Future Secured" was funded ($1,000) as an E3 (Energy, Economics and Environment) Local Action Program by Project KARE, a well-known Environmental Studies Program serving several school districts in Eastern Pennsylvania.

About 30 students organized into five general committees: Activities, Action, Research, Media and Instruction.

The Action group sponsored a "Halloween spook." Members, dressed in energy-related costumes, visited households and treated families to energy conservation literature. The group arranged a lecture by Mr. McCormick of Philadelphia Electric Company for senior high students. The Action Committee created a recycling display and scheduled a solar trailer to visit supermarkets.

The Activities Committee arranged energy-related field trips for E3 members and arranged for members to attend energy conferences to further their knowledge.

Energy information found by members during field trips was given to the Research Committee which collects energy information to be used by all students. From this literature, many term papers dealing with energy, economics and the government were written by U.S. Government and science students. This committee also developed a questionnaire that was used to determine community use of energy, knowledge of energy resources, government policy and methods of conservation.

A great deal of publicity for E3's activities was obtained by the Media Committee. In addition to maintaining a bulletin board and energy showcase, the Media Committee kept local newspapers up to date on project activities. Official stationery for the club was created through a letterhead contest. The Media Committee planned an essay contest on an energy solution in order to involve the students in English classes.

One of E3's greatest achievements was the development of a fifth grade energy learning packet. The three lessons composing the unit are titled "Awareness," "Energy Sources," and "Energy Crisis." All lessons are visual aids, worksheets, and "shoebox" kits, mini lessons for individual indepth learning.

Upper Darby High School
Lansdowne Avenue and School Lane
Upper Darby PA 19084

Submitted by Scott Barr (student) for David Becker, Science Department Head

The following report summarizes work done on a SEPA (Sun Energy Public Awareness) project conducted during the 1977-78 school year.

With the start of school in October, Mr. Becker, Science Department Head and co-sponsor of the program, put a call out for interested students. The first order of business was the pre-test and an outline of plans for the year. Students who were interested met at a later date to continue the program.

Our first planning session was to make up plans for supports of the solar panels. A subcommittee was formed to draw up these plans and after their completion a list of materials was made and grant money was used to purchase wood for the supports. The Industrial Arts Department supplied most of the hardware needed for assembling the supports. Construction was started with mid-December planned for a completion date.

Due to inexperience with construction procedures, the work proceeded slowly but after a little practice we were almost professionals (?). Operations continued after school each day with everyone (about 21 students) helping whenever possible. As we advanced into November, it became obvious that our deadline was not going to be met. This was partly due to our beginning inefficiently but also due to our late school start because of a teacher strike that delayed the opening of school.

Our research subcommittee told us that our planned angle of elevation and compass heading for winter operations (the season that hot-water heating is most needed) differs too much from spring and summer to put the system into functioning order. In order to get some value out of the program, we decided to set the system up (minus plumbing) in the school for community viewing (night school, community college, etc.). Instructional

posters were made and placed in strategic places to explain the operation of the system to viewers.

After the harsh winter passed and our construction crew could work outside, plans were drawn up to mount the panels outside in the courtyard. When construction was completed, a plumbing system was designed and constructed according to the plans supplied with the panels. At long last, our construction was finished.

Now, under the guidance of Mr. Becker, we wired the system and put it into operation for tests. After one sunny day in April, the temperature of the water inside the system reached an operational level, near 120°F, and the system was monitored for awhile. Now that the system is completely operational, we have closed it down for the summer.

The seniors on our committee (most of the group) have now departed and the juniors and sophomores are left with what might be the most difficult task yet: the distribution of heat. A new task was also assigned to us: Is it possible to utilize hot water to heat the soil and experiment with growth rates of selected plants? These are the duties facing the committee next year.

Energy Conservation Corps
South Florence High School
Florence SC 29501

Submitted by Dr. D. Anita Bogardt, District Science Coordinator

The Energy Conservation Corps is a club sponsored by the State Department of Education to promote energy conservation among students in district schools. Under teachers' supervision, high school students plan lessons and activities that will teach energy conservation to younger elementary and middle school pupils. The basic important technique of this program is that students teach other students.

Lesson plans are altered to fit individual classroom situations. Typical activities include crossword puzzles, brain-twisters, student demonstrations, motion picture viewing, studying posters, making collages, and student led discussions.

Three to five class periods are typically devoted to energy conservation, with the agreement of the regular classroom teacher, who schedules the time. Each high school student follows through with all lessons taught in a particular elementary classroom.

Subjective evaluation indicates that elementary and middle school pupils relate very well with high school pupils. All groups involved appear to profit from this project.

Westfield High School
Westfield WI 53964

Submitted by Mr. Fredrick E. Posthuma

Energy education began at Westfield with the advent of a new Industrial Arts program and facility in 1974. During the past four years, approximately 160 students have participated in an industrial arts cluster course called "Energy," while over 120 students have enrolled in advanced energy courses.

Energy, as a one-year cluster course, involves several pertinent modules of study. The first module, covering about 12 hours, is called "The Energy Primer" which sets the groundwork for the rest of the course. This module includes the study of energy in terms of its use, supply and conservation.

Module II, "Energy Awareness," is designed to provide simple hands-on activities for the students. This is basically a short R & D section, as students design, construct and evaluate various projects such as various solar devices, windmills, methane generators, model solar homes, human-powered generators, and so forth. Students have shown great interest and pride in this module. The time is flexible, but usually takes about 20-25 hours.

The final module which lasts to the end of the year is called "Energy In-depth Exploration," and basically does what the title suggests: provides an opportunity for in-depth study in areas of sources, conversion, transmission, and storage and control of energy systems. The students, using various energy kits and equipment, rotate through a station-to-station approach, with each station consisting of several experiments. Examples of some stations are steam power generation, nuclear power generation, pneumatics, hydraulics, electricity, diesels, two- and four-stroke engines, and mechanical systems.

In 1977-78, an $8,000 Title IV-C grant was approved in R & D solar and/or wind energy by the State of Wisconsin. Students, as an extra-curricular project, during the school year, researched, designed and built a two-panel hot water solar heating system to heat darkroom water, and constructed a 61½-foot octahedron tower supporting a 500-watt wind generator which powers a fluorescent sign saying "Westfield Industrial Arts."

Students also compete in energy expositions, and for the past two years have taken overall school first place in the energy competition called "Technology for Society—Energy Problems" contest held at University of Wisconsin—Stout. They have also constructed energy displays for various local and state organizations.

Students, parents, faculty, administration and the public response has been fantastic.

RESOURCES FOR ENERGY EDUCATION

17/18/22

The references annotated in this section contain learning activities and background information useful to secondary school teachers seeking to initiate energy education programs, or to improve existing ones.

All references are identified by ED numbers, which make it possible to locate them easily in the growing number of ERIC microfiche collections distributed widely throughout the United States. Each reference also indicates the cost of microfiche (MF) or hard copy (HC) if the reader wishes to order a personal or library copy from the ERIC Document Reproduction Service, P.O. Box 190, Arlington, Virginia 22210.

The resume for each reference is reproduced as reported in the appropriate monthly issue of Resources in Education, a publication of the Educational Resources Information Center (ERIC) aimed toward early identification and acquisition of reports of interest to the educational community.

ED 111 662 Fowler, John W. Energy-Environment Source Book. Volume 1: Energy, Society, and the Environment. Volume 2: Energy, Its Extraction, Conversion and Use. Washington, DC: National Science Teachers Association, 270p, 1975. (Available from—National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009 - Stock Number 471-14692, $4.00 prepaid.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This source book is written for teachers who wish to incorporate material on the complex subject of energy into their teaching. This work is divided into two volumes, each with numerous tables and figures, along with appendices containing a glossary, mathematics primer, heat engine descriptions, and nuclear energy discussion. Volume 1 (Energy, Society, and the Environment) deals with energy and its relationship with conservation, the environment, the economy, and strategies for energy conservation. In Volume 2 (Energy, Its Extraction, Conversion, and Use), topics discussed include the rate of energy consumption, future sources of energy, and the increased cost of energy.

ED 111 663 Mervine, Kathryn E. and Cawley, Rebecca E. Energy-Environment Materials Guide. Washington, DC: National Science Teachers Association, 68p, 1975. (Available from—National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009 - Stock Number 471-14694, $2.00 prepaid.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is a sampling of current energy literature. The references are divided into four separate categories, each directed for a specific audience: readings for teachers, readings for students (grades 8-10); readings for students (grades 5-9); and readings for students (grades K-6). Included in four appendices are guides for films and audio-visual materials, curriculum materials, sources of information, and government documents.

ED 111 664 Smith, Stephen M., Ed. and Others. Energy-Environment Mini-Unit Guide. Washington, DC: National Science Teachers Association, 217p, 1975. (Available from--National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009 - Stock Number 471-14696, $3.00 prepaid.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This guide contains a collection of mini-units that provide materials for science and social studies teachers in grades K-12. These materials are intended to make teaching more interdisciplinary and to stimulate decision making in young children. Activities are sought that will enable students to: understand and use existing fundamental concepts in the energy-environment area; identify and evaluate personal and community practices, attitudes, and values related to energy-environment issues; and make effective decisions and/or define their views of appropriate actions on energy-environment issues.

ED 119 992 Harder, Alma Jean and Newsom, Carolyn Clark. The Energy Situation. A Two-Week Self-Contained Unit for the Secondary School. Dover, DL: Del Mod System, 51p, 1975. EDRS Price MF-$0.83. HC-$3.50 Plus Postage.

A unit of study is presented in this monograph, intended to be self-sufficient, though teachers are urged to read as much material as possible. Overall objectives are presented. Time allotted is suggested at two weeks. The unit contains ten mini-units, plus class activities, class discussion questions, individual student projects, and possible quiz questions. A bibliography is included in the unit as well as five suggested field trips, possible films with information relating to cost, and place of procurement. Magazines and possible guest speakers are suggested.

ED 127 161 A Teacher's Introduction to Energy and Energy Conservation: Secondary. Columbus, OH: Battelle Memorial Institute; Center for Improved Education; Ohio State Dept. of Education, 97p, 1975. EDRS Price MF-$0.83. HC-$4.67 Plus Postage.

This document is intended to give the secondary school teacher background information and general suggestions for teaching units and correlated learning activities related to energy and energy conservation. Sections are directed to: A Problem Shared by All, Causes, What is Energy?, Energy Sources, Searching for Solutions, Conservation: An Ethic for Everyone, a glossary, and an extensive bibliography.

ED 129 602 Schwartz, Sid L., Ed. Energy Films Catalog. Energy Research and Development Administration, 1976. Oak Ridge, TN: Energy Research and Development Administration, 82p, 1976. EDRS Price MF-$0.83. HC-$4.67 Plus Postage.

This is the first edition of the Energy Research and Development Administration (ERDA) catalog of available motion picture films. One hundred and eighty-eight films, principally

relating to energy, are briefly described and classified into three understanding levels. All films are loaned free, complete borrowing instructions and request forms are provided.

ED 129 677 LaHart, David E., and Allen, Rodney F., Eds. Implementing Energy Education in Florida's High Schools: A Two-Week Credit Institute for Teachers in North Florida. Final Report, Volume II. Tallahassee, FL: Florida State University, College of Education, 102p, 1976. EDRS price MF-$0.83 Plus Postage. HC-$6.01 Plus Postage.

Curriculum units developed by high school teachers are provided for specific content instruction in energy education. Based on group agreement that energy education should assist students in changing attitudes, altering personal behavior and energy consumption, and developing sound alternatives, the units are categorized by social studies, science, and home economics. The social studies units begin with several activities involving energy vocabulary terms. For example, crossword puzzles and bingo games reinforce definitions. A week-long simulation game based on political decision making creates awareness of energy allocation problems in terms of such issues as litter clean-up, new housing developments, and public swimming pools. The science units focus on the technology of biological and physical energy systems. Debates about different types of energy use are encouraged, and laboratory projects such as the construction of a solar biogenerator are encouraged. In the home economics units, students learn methods of energy conservation in family life and personal values. Carefully planned house construction, insulation, and use of shrubbery are seen to reduce energy consumption in all seasons. Making hot pads out of a discarded quilt is one of several suggestions for recycling household materials.

ED 130 833 Coon, Herbert L., and Alexander, Michele Y., Eds. Energy Investigations for the Classroom. Columbus, OH: ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, 148p, 1976. (Available from SMEAC Information Reference Center, 1200 Chambers Road, 3rd Floor, Columbus, OH 43212, $4.95.) EDRS Price MF-$0.83 Plus Postage. HC-$7.35 Plus Postage.

This sourcebook, designed for use in grades K-12, contains energy teaching activities related to energy resources, energy production, distribution and use. Each activity has been classified by the editors according to the most appropriate grade level, subject matter, and energy concept involved. Subject areas are science, mathematics, social studies, language arts, and fine arts. This sourcebook draws heavily on ideas and factual materials found at the ERIC Clearinghouse for Science, Mathematics, and Environmental Education. The references cited in specific activities could be useful to persons interested in obtaining more activities and ideas related to energy. Many of the activities are interdisciplinary in nature and were developed or suggested by public school teachers.

ED 133 192 Energy Education Materials Inventory (e.e.m.i.). Part One: Print Materials. Portland: Energy and Man's Environment, Inc., 102p, 1976. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is one of a six-part inventory of energy education materials. Included in this part is a listing of print materials, including the following: teacher's guides, curriculum guides, ditto masters, textbooks, pamphlets, and posters. For each of the materials listed, the following information is included when available: (1) Title; (2) Author; (3) Availability; (4) Cost; (5) Grade Level; (6) Related Materials; and (7) Evaluation of the Material.

ED 133 193 Energy Education Materials Inventory (e.e.m.i.). Part Two: Non-Print Materials, Part One. Portland: Energy and Man's Environment, Inc., 75p, 1976. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is one of a six-part inventory of energy education materials. Included in this part is a listing of non-print materials including the following: films, filmstrips, slides, transparencies, audio-tapes, and records. For each of the materials listed, the following information is included when available: (1) Title; (2) Author; (3) Availability; (4) Cost; (5) Grade Level; (6) Related Materials; and (7) Evaluation of the Material.

ED 133 194 Energy Education Materials Inventory (e.e.m.i.). Part Three: Non-Print Materials, Part Two: 16 mm Films. Portland: Energy and Man's Environment, Inc., 66p, 1976. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is one of a six-part inventory of energy education materials. Included in this part is a listing of 16 mm films. For each of the materials listed, the following information is included when available: (1) Title; (2) Author; (3) Availability; (4) Cost; (5) Grade Level; (6) Related Materials; and (7) Evaluation of the Material.

ED 133 195 Energy Education Materials Inventory (e.e.m.i.). Part Four: Kits, Games & Miscellaneous Curricula. Portland: Energy and Man's Environment, Inc., 25p, 1976. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is one of a six-part inventory of energy education materials. Included in this part is a listing of kits, games, and miscellaneous curricula. For each of the materials listed, the following items are included when available: (1) Title; (2) Author; (3) Availability; (4) Cost; (5) Grade Level; (6) Related Materials; and (7) Evaluation of the Material. Materials listed in this reference include both print and non-print items for teachers and students.

ED 133 196 Energy Education Materials Inventory (e.e.m.i.). Part Five: Reference Sources. Portland: Energy and Man's Environment, Inc., 42p, 1976. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is one of a six-part inventory of energy education materials. Included in this part is a listing of bibliographies, computer sources of information, directories, educational programs, funded projects, periodicals, and journals. For each of the materials listed, the following information is included when available: (1) Title; (2) Author; (3) Availability; (4) Cost; (5) Grade Level; (6) Related Materials; and (7) Evaluation of the Material.

ED 134 445 Magnoli, Michael A. and Wert, Jonathan M. A Composite of Energy Curriculum Guides and Enrichment Materials. Mobile, AL: Mobile County Public Schools, 16p, 1975. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This bibliography was prepared to provide a listing of a variety of curriculum materials, instructional materials, and references related to energy. Each entry includes: (1) Source, (2) Title, and (3) Comments on grade level and price when available. Materials are primarily selected for relevance to grades K-12.

ED 137 100 Wert, Jonathan and Others. Ideas and Activities for Teaching Energy Conservation: Grades 7-12. Knoxville: Environment Center, Tennessee University, 223p, 1977. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication contains a variety of ideas and materials for teaching about energy in grades 7-12. Topic areas include: (1) Historical Perspective on Energy; (2) Energy Resources; (3) Energy Conservation; (4) Ideas and Activities; and (5) Appendices. The first three sections provide background information on energy and conservation. The activities include ideas to use in science, social studies, language arts, and multidisciplinary areas. The appendices include a variety of useful tables of data, basic information on energy, a glossary, and a bibliography.

ED 143 593 LaHart, David E., and Allen, Rodney F., Eds. Energy and the Environment. Final Report, Volume II. Tallahassee, FL: Florida State University, College of Education, 106p, 1977. EDRS Price MF-$0.83 Plus Postage. HC-$6.01 Plus Postage.

These self-contained energy units were developed by Florida teachers to help high school students better understand energy, energy conservation, and life styles. The major objectives are to help students understand the science and technology of energy, make informed and fair judgments on energy options, make personal life style commitments which are morally responsible, and prepare for participation opportunities in setting energy policy. The units contain

easy to implement student activities which deal with conservation, fossil sources of energy, generating electric power, and life styles. Teachers can integrate the activities into many subject areas including social studies, science, earth science, geography, reading, mathematics, and spelling. The activities are varied and involve students in classroom discussions, making collages, writing pamphlets on ways to conserve energy, drawing cartoons, doing mathematics exercises, constructing a model nuclear power station, and doing scientific experiments. For Volume 1, see ED 129 677.

ED 147 464 Energy and Power Technology. Curriculum Guide. Bismarck, ND: North Dakota State Board for Vocational Education, 102p, 1977. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

One of a set of six guides for an industrial arts curriculum at the junior high school level, this guide provides the basic foundation to develop a one-semester course based on the cluster concept, energy and power technology. The guide suggests manipulative and experimental student-conducted activities or teacher demonstrations which focus on the socio-economic and environmental impact of energy usage and the safety, efficiency, and occupational aspects inherent in the energy/power (E/P) field. Following an introduction covering rationale, cluster outline and objectives, and cluster taxonomic structure, seven units are presented: introductory concepts, safety concepts, energy forms and sources, energy harnessing systems and Newton's Laws, E/P transmission and control, E/P utilization, and E/P career opportunities. Each unit objectives, student competencies and related student activities, unit outline, and where applicable, illustrations and information sheets.

ED 149 994 Environmental Education, Values for the Future: Energy, Grades 9-12. Springfield: Illinois State Office of Education, 58p, 1977. EDRS Price MF-$0.83. HC-$3.50 Plus Postage.

This booklet on energy is one in a series on environmental education for grades K-12. The activities explore energy use and technology, along with their environmental impact. Five basic behavioral objectives are listed with activity options and appropriate subject areas. Three activities are given for each objective. Information for these includes materials and resources, procedures, and discussion questions. The activities are interdisciplinary and are designed for high school students, grades 9-12. They include role playing, games and simulations, physics experiments, and mathematical calculations. Illustrations, data sheets, worksheets, and tables are also given.

ED 151 297 Energy Activities for Junior High Social Studies. St. Paul: Minnesota State Energy Agency, 36p, 1977. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

The document contains seven learning activities for junior high students on the energy situation. Objectives are to help students gain understanding and knowledge about the relationships between humans and their social and physical environments; solve problems and clarify issues; examine personal beliefs and values; and recognize the relationships between beliefs, values, and individual behavior. In the first unit, "For Peat's Sake," social studies and science teachers cooperate. In these experiments the heat value of peat is compared to other materials and it is suggested that peat be used for energy production.

Students collect information about the energy situation in the second unit. They play an energy game and develop a questionnaire to sample student and community opinions about energy. The third unit, "Implications," is a tool which helps students examine possibilities, complexities, interrelationships, and implications of trends and innovations. In the other four units students compare the differences energy has made in life styles; consider the implications of alternative living as energy conservation; discuss what they love and hate about power/energy; and explore the future in terms of their own life styles.

ED 152 773 A Teacher's Handbook on Energy. Austin, TX: Governor's Energy Advisory Council, and Texas Education Agency, 159p, 1977. EDRS Price MF-$0.83 Plus Postage. HC-$8.69 Plus Postage.

Traditional and evolving attitudes toward energy and the compelling reasons for studying energy use and conservation are highlighted in this guide for elementary-secondary school teachers in the instruction of basic energy attitudes. Sample lessons/activities/objectives are presented from three approaches: attitude development, decision making, and action. Charts, graphs, and illustrations are provided as background material for teachers, and the loose-leaf format of the document allows for easy reproduction. An extensive bibliography of journal articles is included.

ED 153 820 Oklahoma Energy Awareness Education, Energy Education Activities, Grades 4-12. Oklahoma City: Oklahoma State Dept. of Education, 220p, 1977. EDRS Price MF-$0.83. HC-$11.37 Plus Postage.

This publication contains energy education activities for grades 4 through 12 and is part of a set of three publications. These activities are organized under five energy concepts: (1) energy is so basic that nothing moves without it; (2) conservation of energy; (3) there are other energy alternatives; (4) society depends on energy; and (5) the production and distribution of energy have environmental and economic consequences. This publication is constructed in a loose-leaf fashion to facilitate the reproduction of activities. Grade

level, objectives, materials, and a description are given for each activity. The variety of activities include laboratory experiments, values clarification exercises, simulations, games, and independent student investigations. Activities are included that may be used in one or more subject areas so that an interdisciplinary approach to energy education is achieved.

ED 153 821 Oklahoma Energy Awareness Education, Resource Materials. Oklahoma City: Oklahoma State Department of Education, 98p, 1977. EDRS Price MF-$0.83. HC-$4.67 Plus Postage.

This publication is the teacher's reference of a series of three energy education publications. This teacher's reference handbook provides background information and some materials to aid the teacher in using the activities in the other two publications. The many charts, graphs, and illustrations are designed to provide the teacher with graphic ways to assist students in understanding energy problems and concepts. The loose-leaf construction of this publication will enable the teacher to remove specific pages for reproduction. Topics discussed in the twelve chapters of this publication include the energy conservation ethic, definition of energy, selected forms of energy used by man, future capital requirements for energy, and energy conservation in agriculture. Chapter 10 is a glossary of energy terms. Chapter 11 lists some selected sources of energy information.

ED 153 841 Brock, Phyllis and Others. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy: Agriculture, Energy, and Society, Grades 10, 11, 12. Washington, DC: National Science Teachers Association, 102p, 1978. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830-no price quoted.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This interdisciplinary instructional unit contains eleven lessons for grades 10-12 which focus on the energy component of food production. There are lessons which contrast food production systems in various cultures and also lessons which look at different systems and techniques in use in this country. There are lessons dealing with organic farming and with the use of wild foods. Each lesson gives an overview, target audience, objectives, materials, time allotment, and teaching strategies, in addition to student worksheets.

ED 153 842 Brock, Phyllis, and Others. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy: 1. How a Bill Becomes a Law to Conserve Energy. Grades 9, 11, 12. Washington, DC: National Science Teachers Association, 122p, 1977. (Available from U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830; no price quoted.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This instructional unit for secondary school students is designed to integrate facts and concepts of energy, environment, and economics into the study of the process of making and applying a law (the fifty-five mile-per-hour speed limit law). The unit contains activities on the legislative process designed to fit into traditional segments of instruction in U.S. history, government, or civics courses. Activities containing learning exercises on constructing and interpreting graphs and tables are suitable for science or mathematics courses. The activities are intended to encourage interdisciplinary teaching. This unit contains complete teacher and student materials including a pre-test, background reading, objectives, teaching strategies, and suggestions for evaluation.

ED 153 843 Childs, Barbara and Others. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy: 3, Energy, Engines and the Industrial Revolution, Grades 8, 9. Washington, DC: National Science Teachers Association, 80p, 1977. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830-no price quoted.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This instructional unit for grades 8-9 combines science and social studies in a look at the broad social and economic upheavals that took place during the industrial revolution, giving special emphasis to the role of energy. The invention and development of the steam engine is highlighted in one lesson. Other lessons show how the industrial revolution affected the location and growth of cities around sites of energy sources, and give greater understanding of the effects of technology on the daily lives of people. There are five lessons in all, two relating to science and three to social studies. Complete teacher and student materials are included.

ED 153 844 Childs, Barbara and Others. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy: 4, Transportation and the City, Grades 8, 9. Washington, DC: National Science Teachers Association, 44p, 1977. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830-no price quoted.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This instructional unit for grades eight and nine tells why and how American small towns declined as a result of the availability and acceptance of automobiles, and it tells of the growth of suburbs and their effect on the city. The learning activities also relate the story of the demand for cars and explain the drain on the cities' sense of space, clean air, and safe streets. In one of the lessons, the students simulate a court trial on the charge ' "The Car Has Done Permanent Injury to Humanity." There are four lessons in this unit. They are designed to fit into existing segments of instruction in U.S. history and civics courses. Complete teacher and student materials are provided.

ED 156 474 Energy Education Resource Guide. Providence: Rhode Island State Department of Education, 74p, 1978. (Available from—Dissemination Unit, Rhode Island Dept. of Education, 22 Hayes Street, Providence, RI 02908—no price quoted.) EDRS Price MF-$0.83. HC-$3.50 Plus Postage.

To help fill the needs of Rhode Island teachers for useful energy education materials, the Dissemination Services Unit of this state's Department of Education has compiled this resource guide. The entries in this document are available either from ERIC or from the Dissemination Services Unit; ED numbers are given for ERIC documents. For all entries, a brief description along with the title and author information are given. The publication lists documents that may be of use in general energy education by grade levels: (1) elementary, (2) secondary, and (3) K-12. Selected journal articles are included along with a resources section including films, periodicals, organizations, and Rhode Island Resources entries. The 120-plus documents entered cover many aspects of the energy dilemma including economics, natural resource allocation and use, federal energy policy, nuclear power, and possible solutions to the problems. Some emphasis is given to the energy situation in Rhode Island, but this resource guide should be useful to educators nationwide.

ED 157 681 Tully, Randolph R., Jr., Ed. A Curriculum Activities Guide to Electric Power Generation and the Environment. Blue Bell, PA: Project KARE, 154p, 1975. (Available from Project KARE, Colony Office Building, Route 73 and Butler Pike, Blue Bell, PA 19422—no price quoted.) EDRS Price MF-$0.83 Plus Postage. HC-$8.69 Plus Postage.

This guide was developed by teachers involved in a workshop on "Electric Power Generation and the Environment." Activity topics are: (1) Energy and the Consumer, (2) Energy and Water Pollution, and (3) Energy and Air Pollution. Within these topics, the activities are classified as awareness level, transitional level, or operational level. Each activity contains an introduction, questions, equipment list, and procedure. There are over 70 activities for students in grades 1-12. The appendix provides a brief description of the development of the learning activities in this guide.

ED 157 782 Wert, Jonathan M., and Worthington, Barry K. ENERGY: Selected Resource Materials for Developing Energy Education/Conservation Programs. Revised Edition. University Park, PA: Pennsylvania State University, College of Agriculture, 34p, 1978. (Available from—National Wildlife Federation, 1412 Sixteenth Street, N.W., Washington, DC 20036-single copies free.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This annotated bibliography presents resource materials for energy education programs. The materials are listed by the agency from which they are available. The agencies are alphabetized and, for each agency, a mailing address is given. Fifty agencies are included, many of which have several

references listed. For each reference, title, author, and publication date are given, along with a four to five-line annotation which describes the contents of the reference and possible uses. Some references also include number of pages and prices. The references in this bibliography were selected to be useful to those involved in developing or implementing an energy education or energy conservation program either in the schools or in community groups. The variety of references includes teaching guides, curriculum development guides, learning activities, energy education units, "how-to-do-it" materials for solar power projects, and consumer awareness publications.

ED 157 818 An Energy History of the United States. Grades 8-9. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. Washington, DC: National Science Teachers Association, 120p, 1978. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830-free, paper cover.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This instructional unit contains eight classroom lessons dealing with a history of energy in the United States for use in grade eight and nine social studies, science, and mathematics courses. The lessons were developed by teachers. The overall objective is to help students understand the present necessity to reexamine and perhaps alter our present energy patterns. Students study about the impact that the different types of energy used from colonial times to the present have had on U.S. culture and learn about the physical properties of wood, coal, and oil, particularly about the ability of these substances to give heat. The activities in which students are involved include answering questions based on short reading selections; gathering and interpreting materials from a picture; comparing the uses of energy by a colonial farm family and by a family of today; constructing a can calorimeter; learning how to determine the energy content of wood; applying the principles of scientific motivation to energy data; constructing and interpreting graphs; making a model of a steam turbine; and learning how to determine the heat content of oil. The amount of time needed to teach each lesson varies from one to four classroom periods. Each lesson is self-contained, and includes instructions for the teacher and student materials. The eight lessons are organized into three units: (1) America's Wooden Age (1650-1820); (2) The Coming of Coal (1840-1920); and (3) Oil: Bright Promise (1880-present).

ED 157 819 Energy in the Global Marketplace. Grades 9, 10, 11. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. Washington, DC: National Science Teachers Association, 54p, 1978. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak

Ridge, TN 37830-free, paper cover.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This instructional unit contains six classroom lessons in which 9th, 10th, or 11th grade social studies students examine the effects of competition among nations and world regions as demand for oil outstrips supply. The overall objective is to help students understand the concept that energy is a commodity to be bought and sold like any other commodity but in a marketplace that is a global one. The lessons were written by teachers and can be integrated into social studies, economics, world history, contemporary issues, and world geography courses. The lessons are: (1) Why Some Nations Use More Energy; (2) Energy: Who Has It; Who Needs It?; (3) From Those Who Have To Those Who Want: The Oil Trade Routes; (4) What If...Everyone Wants More?; (5) Petrodollars: The Problem of Too Much Money; and (6) The Oil Price Game - Everybody Plays (A Simulation of The World Market for Oil). The activities in which students are involved include analyzing maps, graphs, and charts; answering questions based on short reading selections; and playing games. Each lesson can be taught in one classroom period. All teachers and student materials are included.

ED 157 820 U.S. Energy Policy - Which Direction? Grades 11 and 12. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy. Washington, DC: National Science Teachers Association, 92p, 1978. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830—free, paper cover.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This instructional unit for use in 11th and 12th grade social studies and science courses contains six classroom lessons dealing with United States energy policy. The overall objective is to help students understand how circumstances, present and proposed legislation, political action, and the Constitution itself become linked in the development of a national policy. The lessons, developed by teachers, are: (1) The Nightmare Life Without Fuel; (2) How Can the United States Reduce Its Dependence on Foreign Oil?; (3) The President's Powers: Where They Come From and How They Are Used; (4) Advantages and Disadvantages of Coal; (5) Toward the Future: The Advantages of Having a National Energy Plan; (6) An Energy Policy is Born. Activities in which students are involved include discussing the short reading selections; analyzing graphs and research; and analyzing a case study dealing with President Carter's energy policy. The time needed to teach each lesson varies from one to three classroom periods. All teacher and student materials are included. Also included for the teacher's reference is a brief summary of President Carter's energy policy.

ED 159 022 Carey, Helen H., Ed. Award Winning Energy Education Activities for Elementary and High School Teachers. Washington, DC: National Science Teachers Association, 52p, 1977. (Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN-no price quoted.) EDRS Price MF-$0.83 Plus Postage. HC-$3.50 Plus Postage.

This publication contains descriptions of the winning entries to the National Science Teachers Association Participation Contest in 1976. This was a nationwide contest for the design of activities around energy themes at any grade level, K-12. The ten winning entries described here are: (1) Energy Units for Primary Grades; (2) Aluminum Recycling Experiment; (3) Energy in Art and Energy is All Around Us; (4) Black Gold; (5) Energy, Economy, Education; (6) Local Investigation in Container Use; (7) Kill A Watt; (8) Idea: Designing an Energy-Efficient House; (9) Solar Heating and Cooling; and (10) Living with Wind Power. Many of these winners are designed for the senior high school. Each one has included a brief summary of what the activity teaches, what the students do, and how the activity might fit into the existing curriculum.

ED 159 042 Jones, John, and Dalton, Edward. The Energy and Environment Glossary, 1977. Portland, OR: Energy and Man's Environment, 50p, 1977. (Available from Energy and Man's Environment, 0223 S.W. Hamilton, Suite 301, Portland, OR 97201-$4.00.) EDRS Price MF-$0.83 Plus Postage. HC-$2.06 Plus Postage.

This is a glossary of words that commonly appear in energy education and environmental education materials. With over 750 words ranging from "abatement" to "zooplankton," this publication includes such uncommon terms as "anadramous," "film badge," "putrescible," and "tritium." Space is provided after each alphabetical section for the addition of words not included in the publication. The publication seems to have been written for use by upper elementary and junior high school students. The definitions are non-technical and, where appropriate, include comments on how the term relates to environmental issues. This glossary should also be useful to teachers,

ED 160 418 Gerlovich, Jack A. Energy Concepts in the Iowa School Curriculum. Des Moines, IA: Iowa State Department of Public Instruction, 32p, 1978. EDRS Price MF-$0.83 Plus Postage. HC-$2.06 Plus Postage.

This document reports on the Iowa Department of Public Instruction Plan to integrate energy education into elementary and secondary programs. This plan includes the development of energy conservation activity packets. The packets contain a variety of interdisciplinary activities, accompanying worksheets, visuals, and annotated children and teacher bibliographies for grades K-6. Also included in the plan is the Mankato State University Energy Program, which is designed to acquaint teachers with some classroom projects that can be done

by students in grades 7-12, and give teachers an extended classroom project in which students evaluate the energy consumption of their school. Finally, this report presents the results of a questionnaire designed to assess the present energy programs and perceived energy needs of Iowa secondary school teachers. The dominant concerns of the teachers surveyed were energy conservation and the political and social aspects of energy problems.

ED 160 439 Energy Education Materials Inventory, Volume I: An Annotated Bibliography of Currently Available Materials, K-12, Published Prior to May, 1976. Houston, TX: University of Houston Energy Institute, 301p, 1978. (Available from National Technical Information Service, U.S. Department of Commerce, 5825 Port Royal Road, Springfield, VA 22161; MF-$3.00, HC-$11.75.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication is a systematic listing of energy education materials and reference sources suitable for use in elementary and secondary schools. Items in this volume, located through computer searches, were still available in May, 1978. This inventory of energy resource materials consists of three indexes: media, grade level, and subject. Each major part is divided into sections and citations are alphabetically listed in each section. Media is divided into: (1) Audiovisual; (2) Books; (3) Instructional Materials; (4) Activities; and (5) Reference Sources. Grade level is sectioned into: (1) Kindergarten; (2) Primary; (3) Elementary; (4) Intermediate; (5) Secondary; and (6) Special Education. Subject is divided into the following sections: (1) Alternative Energy Sources; (2) Biology, Chemistry, Physics, and General Science; (3) Energy Conservation, Consumption, and Utilization; (4) Environmental-Social Aspects of Energy Technology; (5) Fossil Fuels; (6) Materials; and (7) Policy and Legislation. Approximately 800 items are included in this resource list.

ED 161 727 Energy Conservation Activities for the Classroom, K-12. Frankfort, KY: Kentucky Department of Energy, Kentucky Department of Education, 244p, 1978. EDRS Price MF-$0.83 Plus Postage. HC-$12.71 Plus Postage.

After a brief introduction entitled "Where Does the Energy We Use Come From," this unit presents 86 activities. Each activity gives the title, concept, objectives, subject area, level, time involved, materials needed, procedures, and related career activities. Topics cover everything from housing insulation to alternate sources of energy to energy use by appliances and automobiles. The activities include game playing, science experiments, surveys, field trips, and others. The unit concludes with a bibliography.

ED 162 851 Norton, Thomas W., and Others. Solar Energy Experiments for High School and College Students. Emmaus, PA: Rodale Press, Inc., 141p, 1977. (Available from Rodale Press, Inc., 33 E. Minor Street, Emmaus, PA 18049-$5.95.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication contains eighteen experiments and eight classroom activities. The experiments are of varying difficulty and cover the important aspects of solar energy utilization. Each experiment is self-contained, with its own introduction and background information. Energy measurements are emphasized and techniques for collector efficiency determinations are considered. Among the topics discussed are: (1) altitude and azimuth of the sun; (2) radiation characteristics; (3) energy collection with converging lenses; (4) air and water solar collectors; and (5) energy storage in gravel beds and in salt hydrates. Both theoretical and practical engineering considerations are illustrated by the experiments. Many experiments are directly applicable to existing physics, general science, and environmental science curricula, while others are of sufficient difficulty and duration to challenge college and the most advanced secondary students. The eight classroom activities present worldwide energy data and solar energy data for individual student analysis. This manual can serve as a useful classroom resource as well as a general reference.

ED 162 886 An Educator's Introduction to Energy Concepts: Overview Packets. Falmouth, ME: Maine Audubon Society, 68p, 1977. EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication provides a broad overview of energy and related issues for teachers and others who want to improve their understanding of these issues. Included in this publication are discussions of: (1) elementary physics related to energy; (2) energy sources, including topics such as renewable and non-renewable resources and fossil fuels; (3) energy uses in the U.S.; (4) thermodynamics; (5) space heating; (6) energy conservation; and (7) socioeconomic aspects of the energy crisis. The last section entitled Consumption Life Style is designed for social science teachers and discusses the effects of population increases on natural resources and social values. Diagrams and tables are provided to illustrate, among other things: (1) energy consumption rates of various electric appliances; (2) energy uses by economic sector; (3) U.S. energy flow from source to work and waste; and (4) the flow of energy to and from earth.

ED 162 900 Energy Education Materials Bibliography. St. Paul: Minnesota State Energy Agency, 65p, 1978. EDRS Price MF-$0.83 Plus Postage. HC-$3.50 Plus Postage.

This is an annotated bibliography of selected energy education materials. The materials included in this document are indexed according to grade level and according to whether they are background materials or classroom activities. Each of the 100 items listed were evaluated and included into either the "A" list or the "B" list. The "A" list contains activities and background materials that were judged to be somewhat better

by virtue of: (1) content included; (2) activities; (3) ease of use; (4) background material; and/or (5) reference provided. The "B" list contains activities and background materials which cover a wider range of subjects and approaches and may be used as the core of or as supplements to energy units. In addition to the usual bibliographic information, such as title, author, publisher/source, other information included is: (1) suggested grade levels; (2) suggested subject areas; (3) media type; (4) cost and date issued; (5) types of activities; (6) energy topics; (7) approaches; (8) student outcomes; (9) what teacher background is assumed, and (10) general comments. Also indicated is whether materials are designed for use by students, teachers or both.

ED 162 912 Energy: An Annotated Bibliography of Selected Energy Education Materials. Lincoln, MA: Massachusetts Audubon Society, H Hatheway Environmental Education Institute, 64p, 1977. EDRS Price MF-$0.83 Plus Postage. HC-$3.50 Plus Postage.

This is an annotated bibliography of selected energy education materials. These materials were selected according to the following criteria: (1) Usability in an instructional atmosphere; (2) Relevancy to issues on energy use in the environment; (3) Accuracy and current relevancy of energy facts and trends; (4) Attractiveness of format including organization; (5) Emphasis on energy conservation and quality of life; and (6) Emphasis on student involvement in classroom or community activities. A coding system is used for cross-referencing and for indicating grade level and conceptual area for which an entry is appropriate. A variety of different types of materials including: (1) bibliographies; (2) pamphlets; (3) books; (4) periodicals and articles; (5) teaching guides; and (6) audiovisual materials and simulations are annotated in this bibliography.

ED 164 287 ENCORE: Energy Conservation Resources for Education. College Station, TX: Texas A&M University, Department of Industrial Education, 463p, 1977. EDRS Price MF-$0.83 Plus Postage. HC-$24.77 Plus Postage.

This publication contains the energy education materials for middle schools from project ENCORE (Energy Conservation Resources for Education). These modules were originally field tested in Texas schools during the 1976-77 academic year. The revised materials in this publication are organized into four major units and thirteen chapters. The chapters provide objectives, informational coverage of topics, activities, and vocabulary lists for students. "Suggestions to the Teacher" sections provide lists of materials, tests, scoring keys, resource lists, and media aids suggestions. The information and activities were designed for use in middle and junior high school industrial arts and science classes. These materials can also be used in other subject areas when exploring energy-related topics. The four major sections are: (1) Introduction;

(2) Energy Sources and Energy Production; (3) Energy Conservation; and (4) Alternative Energy Sources. Chapter titles include: (1) Energy in Texas; (2) Environmental Quality and Energy; (3) Energy Saving Tips; (4) Solar Energy; (5) Unusual Energy Sources; and (6) Grow Your Own Garden. Although the materials were written for use in Texas, they may easily be adapted to other areas.

ED 164 299 The Energy Primer. Chattanooga, TN: Tennessee Valley Authority, Division of Power Utilization, 47p, 1976. EDRS Price MF-$0.83 Plus Postage. HC-$2.06 Plus Postage.

This publication is an information source on energy for teachers. The information in this publication is factual and designed for courses of study about energy. This book has been divided into separate energy-related sections. Each section ends with a list of student participation discussion activities. The sections present facts about: (1) energy and its use; (2) oil and natural gas; (3) coal and hydropower; (4) nuclear energy; (5) energy used for transportation; (6) future energy sources; (7) electrical power sources in the TVA area; and (8) energy conservation. A glossary of terms is also provided. This publication was designed as a teacher's resource, not as a curriculum guide. The activities suggested are more appropriate for junior and senior high school students.

ED 165 988 Priddy, Michael D., Ed., and Others. Energy Conservation Education Resource Guide. Greensboro, NC: Guilford County School System, 175p, 1978. EDRS Price MF-$0.83 Plus Postage. HC-$8.69 Plus Postage.

Although designed as a resource for teachers in the Guilford County (North Carolina) School System, this guide contains information applicable to most K-12 curricula. There are five color-coded sections, each devoted to specific grade levels: K-3, 4-6, 4-9, 10-12. The Appendices include field trip possibilities, an energy use checklist, and illustrations. Each grade level section contains energy concepts, related activities, and resources for the teacher. There is an annotated bibliography containing entries for all resources listed at the end of each section. This resource guide is not intended to provide an exhaustive list of concepts, activities, and resources, but rather is a working tool to be amended and modified by teachers. An interdisciplinary and integrated approach is used throughout the guide.

ED 166 009 Jones, John, Ed. Energy and Man's Environment: Activity Guide. An Interdisciplinary Teacher's Guide to Energy and Environmental Activities. Portland, OR: Energy and Man's Environment, Inc., 36p, 1976. (Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201-$25.00 a set, including ED 166 009 through ED 166 015.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication provides the goals, concepts, objectives, and rationale for the six activity guides in this series of energy education materials. The organization of this series, as presented in this publication, centers around sic goals which correspond to the activity guides. Under each goal are several concepts, which in turn, have several objectives. These concepts and goals are referenced above the activities included in the guides. The six goals are: (1) It is essential that each person know that there are many sources of energy; (2) It is essential that each person know that people are dependent upon energy; (3) It is essential that each person know that energy can be converted from one form to another; (4) It is essential that each person know how man's use of energy creates an impact on the environmental and economic systems; (5) It is essential that each person know that the earth's resources are limited; and (6) It is essential that each person know that new energy sources and more efficient systems, accompanied by different consumption practices, may alter the world energy dilemma. This conceptual outline may be of use to teachers, curriculum specialists, and researchers.

ED 166 010 Jones, John, Ed. Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section One - Sources of Energy. Portland, OR: Energy and Man's Environment, Inc., 44p, 1976. (For primary availability of the set, see ED 166 010.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication presents the activities pertaining to the first goal of this activity guide series. The activities in this publication focus primarily on the availability of resources, forms of energy, natural laws, and socioeconomic considerations. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in a variety of ways. The activities are simply ideas of things that sutdents can do to help them understand the concepts. It has been left to the teacher to choose and implement these ideas as desired. Activities range from an energy unit "treasure hunt" to dramatizing an Inca coronation.

ED 166 011 Jones, John, Ed. Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Two - Uses of Energy. Portland, OR: Energy and Man's Environment, Inc., 56p, 1976. (For primary availability of the set, see ED 166 009.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication presents the activities pertaining to the second goal of this activity guide series. The activities in this publication focus primarily on awareness, conservation, and planning. These materials are appropriate for

middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in many ways. The activities are simply ideas of things that students can do to help them understand the concepts. It has been left for the teacher to choose and implement these ideas as desired. Activities range from writing a story that details the impact on members of a food chain when one member is removed to conducting a community survey to determine how people are trying to conserve energy.

ED 166 012 Jones, John, Ed. Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Three - Conversion of Energy. Portland, OR: Energy and Man's Environment, Inc., 55p, 1976. (For primary availability of the set, see ED 166 009.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication presents the activities pertaining to the third goal of this activity guide series. The activities in this publication focus on understanding conservation processes, efficiencies, socioeconomic costs, and personal decision-making. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in many ways. The activities are simply ideas of things that students can do to help them understand the condepts. It remains for the teacher to choose and implement these ideas as desired. Activities range from stating the first and second laws of thermodynamics so the students' parents can understand them to designing a house which runs entirely on solar energy.

ED 166 013 Jones, John, Ed. Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Four - Impacts of Energy. Portland, OR: Energy and Man's Environment, Inc., 83p, 1976. (For primary availability of the set, see ED 166 009.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication presents the activities pertaining to the fourth goal of this activity guide series. The activities in this publication focus on the socioeconomic effects of energy uses and crises and the understandings needed to assess those effects. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in many ways. The activities are simply ideas of things students can do to help them understand the concepts. It remains for the teacher to choose and implement those ideas as desired. Activities range from an experiment measuring sulphur dioxide in automobile exhaust to mapping the major sea lanes between oil-producing countries oil-importing countries.

ED 166 014 Jones, John, Ed. Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Five - Limits of Energy. Portland, OR: Energy and Man's Environment, Inc., 50p, 1976. (For primary availability of the set, see ED 166 009.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication presents the activities pertaining to the fifth goal of this activity guide series. The activities in this publication relate to understanding nature and the natural limits to growth, personal consumption practices, and the social and technological implications of rapidly depleting the world's natural resources. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in a variety of ways. The activities are simply ideas of things students can do to help them understand the concepts. It remains for the teacher to choose and implement these ideas as desired. Activities range from writing a story explaining what the earth's energy resources will be like by the year 2000 to role playing an election to illustrate how the class can get their views into the government. Some of these activities may be suitable for high school students as well.

ED 166 015 Jones, John, Ed. Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Six - Future Sources of Energy. Portland, OR: Energy and Man's Environment, Inc., 43p, 1976. (For primary availability of the set, see ED 166 009.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This publication presents the activities pertaining to the sixth goal of this activity guide series. The activities in this publication relate principally to the more advanced technologies and the implications of their development. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary. The activities are simply ideas of things students can do to help them understand the concepts. It remains for the teacher to use these ideas as desired. Activities range from preparing and delivering an energy briefing to the class using the style of Walter Cronkite and information collected from the news media to listing the various kinds of educational requirements needed to pursue a career in technology.

ED 166 032 Elvin, Betty, and Others. Texas Energy Education Framework: A Pilot Draft. Austin, TX: Texas Education Agency, 28p, 1978. EDRS Price MF-$0.83 Plus Postage. HC-$2.06 Plus Postage.

This publication presents a conceptual framework for grades K through 12 energy education in Texas. Matrices are used in which "basic concerns of people" such as: (1) individual well-being; (2) career; and (3) social interactions are given

on one axis and three learning dimensions: (1) knowledge; (2) applications; and (3) values are used on the other axis. These matrices are to serve as a guide to curriculum development and are given for grade levels K-3, 4-6, 6-8, and 9-12. Energy education experiences are given for parts of these matrices. Infusing energy education into existing curricula is expanded and a rationale for energy education is given.

ED 166 066 Albert, Harold E., Ed. Putting "Energy" in Your Course: 1978. A Collection of Energy Teaching Units Designed by the Participants of the Energy Institute for Secondary Science and Social Science Teachers. Clemson, SC: Clemson University Department of Political Science, 180p, 1978. EDRS Price MF-$0.83 Plus Postage. HC-$10.03 Plus Postage.

This collection of energy teaching units is the contribution of participants in a U.S. Department of Energy sponsored institute for secondary science and social studies teachers. The objectives of the Institute were to: (1) provide an overview of past, present, and future energy problems, and (2) stimulate teachers to use this information in their own courses. The units are for a broad range of disciplines and include topics such as: fossil fuels, energy conservation, nuclear power, economics of energy, coal mining, future trends, U.S. energy policy, electricity generation, and chemical aspects of energy production. Each unit includes objectives, daily activities and bibliography.

ED 166 067 Rinehart, Milton, Com., and Others. Energy Education: A Bibliography of Abstracts from "Resources in Education (RIE)" from 1966-1978. Columbus, OH: Information Reference Center for Science, Mathematics, and Environmental Education, 159p, 1979. (Available from Information Reference Center, The Ohio State University, 1200 Chambers Road, 3rd Floor, Columbus, OH 43212-$5.50.) EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

This is a compilation of abstracts from "Resources in Education" for publications relating to energy education. The publications announced relate to energy education by being: (1) instructional materials such as teaching activity guides; (2) teacher resource guides; (3) information sources on energy resources; or (4) school building conservation materials. Information given for each entry includes: (1) ERIC and clearinghouse accession numbers; (2) title; (3) author; (4) descriptors; (5) EDRS price; (6) abstract; and (7) institution or sponsoring agency name. The abstracts are descriptive paragraphs which indicate the contents of each publication. Over 500 publications are included in this bibliography. Subject, author, and institutional author indices are included to aid the user in locating a particular publication in this bibliography.